REMARKS

Claims 1-8 have been examined. Claims 4, 5 and 8 have been canceled without prejudice or disclaimer. Applicant reserves the right to pursue the canceled subject matter in a continuation or divisional application. Also, new claims 11 and 12 have been added to further describe various features of the present invention.

I. Election/Restriction Requirement

Applicant affirms that the election of Group I, claims 1-8 for prosecution, without traverse. Withdrawn method claim 9 has been amended to include all of the limitations of product claim 1. If product claim 1 is found to be allowable, Applicants respectfully request rejoinder of the withdrawn method claims pursuant to MPEP § 821.04.

II. Rejections under 35 U.S.C. § 102 to Urashima

The Examiner rejects claims 1-2, 4 and 7-8 under 35 U.S.C. 102(b) as being anticipated by Urashima et al. (US Pub. No. 2002/0155712, hereinafter "Urashima").

A. Claims 1, 2 and 4

Claim 1, as amended, recites:

> a substrate, and a plurality of Group III nitride semiconductor layers provided on the substrate, wherein a first layer which is in contact with the substrate is composed of silicon-doped $Al_xGa_{1-x}N$ ($0 < x \leq 1$) and has a structure formed of aggregated columnar crystal grains having a width of 10 to 100 nm.

The Examiner asserts that Figures 1 and 6 Urashima disclose all the claimed features of claim 1. In particular, the Examiner asserts that paragraph 153 of Urashima discloses a silicon doped GaN layer 12 in contact with substrate 11. Urashima, however does not disclose that the

first layer which is in contact with the substrate is composed of silicon-doped $Al_xGa_{1-x}N$ ($0 < x \leq 1$), as recited in amended claim 1.

Furthermore, Urashima fails to disclose a first layer which is in contact with the substrate is composed of silicon-doped $Al_xGa_{1-x}N$ ($0 < x \leq 1$) and has a structure formed of aggregated columnar crystal grains having a width of 10 to 100 nm.[1]

Since Urashima fails to disclose each and every feature of claim 1, Applicant submits that claim 1 is patentable for at least this reason.

Claim 2 should be patentable at least by virtue of its dependency upon claim 1. Furthermore, claim 4, the features of which have been incorporated into claim 1, has been canceled.

B. Claims 7 and 8

Claim 7 includes analogous, though not necessarily coextensive features recited in claim 1, and therefore, claim 7 is patentable for the reasons discussed for claim 1. Furthermore, claim 8, the features of which have been incorporated into claim 7, has been canceled.

III. Rejection under 35 U.S.C. § 102 to Ishibashi

The Examiner rejects claim 3 under 35 U.S.C. 102(b) as being anticipated by Ishibashi et al. (US 6,165,812, hereinafter "Ishibashi"). Figures 5, 6, and 11 of Ishibashi were cited as disclosing a Group III nitride semiconductor device meeting the terms of the rejected claims including a substrate (10), and a plurality of Group III nitride semiconductor layers (10, 211 (as 11)), 12) provided on the substrate (10), wherein a first layer (211a) which is in contact with the

[1] See rejection under 35 U.S.C. § 103.

substrate (10) is composed of AlN (which is $Al_xGa_{1-x}N$, x=1). According to the Examiner, the Group III nitride semiconductor device is said to have a difference in height between a protrusion and a depression which are present at the interface between the first layer (11) and a second layer (top of 11c) provided thereon of 10 nm or more (Fig. 7 shows the surface roughness is close to 100 angstroms (10nm)) and is equal to, or less than, 99% the thickness of the first layer (21la) (thickness of 21la (50nm) + the surface roughness (10nm) = 60 nm => (10/60)x100 is less than 99%).

However, Figure 7 of Ishibashi clearly illustrates a surface roughness of the AlGaN layer of less than 100 angstroms, or less than 10 nm. Applicant notes that Figure 7, which at best may show that the surface roughness is "close to" 10 nm, is not sufficient to maintain the rejection. Claim 3 clearly recites that the difference in height between a protrusion and a depression which are present at the interface between the first layer and a second layer provided thereon is 10 nm or more. Ishibashi fails to disclose this feature. Therefore, claim 3 should be patentable for at least this reason.

IV. Rejections under 35 U.S.C. § 103

The Examiner rejects claims 5-6 under 35 U.S.C. 103(a) as being unpatentable over Urashima in view of Udagawa (JP 08282524). Applicant notes that claim 1 has been amended to incorporate the features of claim 5, and claim 5 has been canceled. The Examiner indicates that Urashima fails to teach or suggest the features recited in claim 5 and cites Udagawa to correct the deficiencies of Urashima with regard to claims 5 and 6.

Particularly, paragraph 13 of Udagawa was cited as teaching that the width of the columnar crystal grains of the buffer layer (AlGaN) can be changed. Although Udagawa appears

to teach that the shape of the columnar crystals grains can be changed, Udagawa does not teach the specific width parameters (width of 10 to 100 nm) of claim 1. A person of ordinary skill in the art would understand that the shape of the columnar crystal grains may vary and depend on a number of factors and conditions. Udagawa fails to teach or suggest that conditions are present which may produce the claimed columnar crystal grain width of 10 to 100 nm. Therefore, the Examiner's assertion does not necessarily translate into teaching the specific width parameters of claim 1.

For example, paragraph 13 of Udagawa discloses that a shape of crystal grains is changed by a growth temperature of the buffer layer. Namely, it is disclosed that the shape is as shown in Fig. 8 when the growth temperature is 620°C, and the shape is as shown in Fig. 9 when the growth temperature is 920°C. However, paragraph 13 of Udagawa only states that a shape of crystal grains is changed by a growth temperature of the buffer layer and there is no description and no suggestion regarding the width of the crystal grains.

Furthermore, the width of the columnar crystal grains is changed by other conditions, for example, the ammonia/Group III metal source ratio (see page 12, lines 25-28 of the present specification), as well as the growth temperature. Further, the first layer of the present invention is formed by the first step and the second step (see page 12, lines 17-24 of the present specification). The first step is preferably carried out at a temperature of 950 to 1,250°C (see page 13, lines 26-27 of the present specification) and the second step is preferably carried out at a temperature of 1,050 to 1,250°C (see page 14, lines 3-4 of the present specification). On the other hand, the temperatures described in paragraph 13 of Udagawa are 620°C and 920°C, and thus are different from the preferable temperatures in the present invention. Therefore, it is

impossible to select a width of 10 to 100 nm as claimed in original claim 5 from the description in paragraph 13 of Udagawa.

In view of the above, Udagawa does not correct the aforementioned deficiencies of Urashima with respect to the original claim 5 of the present invention. Therefore, Applicant submits that claim 1 is patentable for at least this reason.

Claim 6 should be patentable at least by virtue of its dependency upon claim 1.

V. New claims

New claims 11 and 12 are added to recite additional features of the present invention. No new matter is added.

VI. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. Withdrawal of all rejections, rejoinder of method claims 9 and 10 and allowance of claims 1-3 and 6-12 is earnestly solicited.

If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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